1-1-2014

HIV Risk among Substance-Using Men who have Sex with Men and Women (MSMW): Findings from South Florida

Mackey R. Friendman
University of Pittsburgh, mrf9@pitt.edu

Steven P. Kurtz
Nova Southeastern University, steven.kurtz@nova.edu

Mance E. Buttram
Nova Southeastern University, mance.buttram@nova.edu

Chongyi Wei
University of California, San Francisco, Chongyi.Wei@ucsf.edu

Anthony J. Silvestre
University of Pittsburgh, tonys@pitt.edu

See next page for additional authors

AIDS Behav (2014) 18:111–119
DOI 10.1007/s10461-013-0495-z

ORIGINAL PAPER

HIV Risk Among Substance-Using Men Who Have Sex with Men and Women (MSMW): Findings from South Florida

M. Reuel Friedman · Steven P. Kurtz · Mance E. Buttram · Chongyi Wei · Anthony J. Silvestre · Ron Stall

Published online: 8 May 2013

Abstract Compared with men who have sex with men only (MSMO), men who have sex with men and women (MSMW) consistently report higher rates of two HIV risk behaviors: transactional sex (TS) and concurrent substance use and sex (CSS). Within MSMW, little is known about how synergistic epidemics ("syndemics") affect TS and CSS. Using a sample of substance-using MSM ($n = 515$) in South Florida, we compared TS and CSS among MSMO and MSMW; examined whether, within MSMW ($n = 86$), TS and CSS predict unprotected anal intercourse with partners of serodiscordant/unknown HIV status (SU-UAI); and tested whether syndemics predict TS and CSS. MSMW reported higher rates of engaging in both TS and CSS (AOR = 1.7; 95 % CI 1.0–3.0). Within MSMW, engagement in both TS and CSS predicted SU-UAI (AOR = 3.3; 95 % CI 1.2–9.6); and syndemics predicted TS and CSS involvement ($p < 0.01$). Substance-using MSMW may benefit from interventions targeting TS, CSS, and background syndemics.

Keywords HIV/AIDS · Bisexuality · Transactional sex · Concurrent substance use and sex · Syndemics

Introduction

An increasing literature on broad health disparities among men who have sex with men (MSM) has emerged over the past few decades, including HIV and other sexually transmitted infections (STI), mental health, and other psychosocial health problems [1]. Health disparities among MSM have been theoretically and empirically linked to disparate rates of adversity in childhood and adulthood: peer bullying, violence victimization, and sexuality-related discrimination [2–4], which work together to increase effects of minority stress [5] and contribute to the development of these co-occurring disparities [6–8]. Together, these findings lead to the conclusion that there are serious and closely linked health challenges among MSM that need to be addressed. The term "syndemics" has been recently used to describe the burden of synergistic epidemics that the MSM population suffers [1]. Within MSM, little is known about how syndemics function among a particularly vulnerable subpopulation: men who have sex with men and women (MSMW). When compared with men who have sex with men only (MSMO), MSMW tend to present a more worrisome health profile. One of the most striking behavioral differences between the two groups has to do with the

M. R. Friedman (✉) · A. J. Silvestre
Department of Infectious Diseases and Microbiology, Graduate School of Public Health, University of Pittsburgh, P.O. Box 7319, Pittsburgh, PA 15213, USA
e-mail: mrf9@pitt.edu

M. R. Friedman · A. J. Silvestre · R. Stall
Center for LGBT Health Research, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, PA, USA

S. P. Kurtz · M. E. Buttram
Center for Applied Research on Substance Use and Health Disparities, Nova Southeastern University, Coral Gables, FL, USA

C. Wei
Department of Epidemiology & Biostatistics, School of Medicine, University of California, San Francisco, San Francisco, CA, USA

R. Stall
Department of Behavioral and Community Health Sciences, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, PA, USA

greater tendency of MSMW to engage in transactional sex, defined as trading sex for money or drugs [9–13]. MSMW have also reported substance use and engaging in concurrent substance use and sex at greater rates than MSMO [13–17]. This raises an epidemiologic puzzle: why would MSMW be more likely to engage in these behaviors than MSMO?

Qualitative research has suggested that for many MSMW, transactional sex serves as an introduction to same-gender sex: the transactional sex demimonde may be viewed as a multi-gendered scene wherein both substance use and sexual needs can be met, and wherein the transactional component enables and motivates concurrent substance use and sex with other men [18–21]. Involvement in transactional sex and concurrent substance use and sex have been separately reported as behaviors that help MSMW psychologically buffer the stigma of their same-sex behaviors [19, 22]. The intersection of transactional sex involvement and having sex while high may constitute a particularly risky milieu for MSMW. Concurrent sexual and substance use behavior, especially stimulant drug use, has been shown to be an important predictor of HIV seroconversion among MSM generally [23]. Male sex work involvement has also been demonstrated to significantly predict both current and future HIV risk behavior and depression [24]. Within populations of Black MSMW, concurrent substance use and sex is associated with higher rates of unprotected sex with male and transgender sexual partners [25]; and selling sex has been significantly correlated with unprotected insertive anal intercourse (UIAI) [10].

Research is needed to identify correlates of concurrent substance use and sex and transactional sex among MSMW in order to better inform intervention development: what background forces drive these behaviors? Guided by Syndemics Theory for MSM [1, 6–8], we hypothesized that higher levels of psychosocial problems (such as homelessness, depression, sexual compulsivity, and violence victimization) among MSMW were also associated with greater HIV risk behavior. In doing so, we hoped to pinpoint the psychosocial and behavioral intervention-related needs of MSMW at very high risk for HIV acquisition and transmission. First, we examined whether MSMW engage in concurrent substance use and sex and transactional sex at significantly higher rates than MSMO. Second, we tested within MSMW to see whether engaging in both concurrent substance use and sex and transactional sex significantly predicts unprotected anal intercourse (UAI) with partners of serodiscordant or unknown HIV status. Finally, we tested whether, among MSMW, syndemic burden significantly predicts engagement in both transactional sex and concurrent substance use and sex.

Methods

Sample

We conducted a secondary analysis of baseline data of substance-using MSM ($n = 515$) in South Florida (Miami/Ft. Lauderdale) enrolled in a randomized clinical trial designed to test the efficacy of a four-session small group-level intervention compared to a single-session individual-level intervention condition. Participants were recruited between November 2008 and October 2010 through multiple methods, including direct outreach at community and gay pride events, social media websites, participant referral, flyers, and internet and print classified advertisements; recruitment targeted substance-using MSM. Men were eligible to participate if they were between 18 and 55 years old; reported UAI with at least one non-monogamous partner in the past 90 days; and met one or more of three substance use inclusion criteria: binge drinking (five or more drinks) or drug use, excluding marijuana, at least three times in the past month; or marijuana use on at least 20 days in the past month. All interviews were conducted using computer-assisted face-to-face interviews in private offices; interviews lasted approximately 90 minutes. Upon completion of the baseline interview, participants were offered educational literature related to HIV and substance use, condoms, and a $50 stipend. Research protocols were approved by Institutional Review Boards of the University of Delaware (predecessor institution), Nova Southeastern University, and the University of Pittsburgh. Sampling methods have been described in greater detail elsewhere [26].

Measures

The main data collection instrument was the Global Appraisal of Individual Needs [27]. Men were classified as MSMW if they reported having sex with a female in the past year.

Covariates: We collected basic *sociodemographic* information about participants' age, race, ethnicity, annual income, educational attainment, HIV status, and sexual identity.

Outcome variables: We collected data on *sexual behaviors* with both primary and non-primary male sexual partners in the past 90 days. Participants reported the partner type and HIV status (negative, positive, or unknown) of each partner, and frequency of unprotected insertive and receptive anal intercourse with male partners in the prior 3 months. Based on participants' self-reported HIV status, perceived HIV status of sexual partners, and sexual behaviors, variables were created that measured

UAI with a partner of serodiscordant or unknown HIV status (hereafter termed "high-risk UAI").

Frequencies of *concurrent substance use and sex* in the past 3 months were assessed by participants reporting past 90-day frequencies of using each of the following substances before having sex with a man: binge drinking (five or more drinks at one sitting), methamphetamines, crack cocaine, powder cocaine, ecstasy, and marijuana. Responses were later converted to dichotomous (any vs. none) variables for each substance. Participants were additionally asked, "How often in the last 3 months were you 'high' on alcohol or drugs when you were having anal sex with a man?" Interval-level responses (almost all the time/more than half the time/about half the time/less than half the time/never) were later dichotomized (almost all the time vs. other). This variable was termed CSS (concurrent substance use and sex).

Transactional sex (TS) was defined as either trading sex or trading for sex within the past 12 months. Participants were asked, "During the past 12 months, did you trade sex to get drugs, gifts, or money?" and "During the past 12 months, did you use drugs, gifts, or money to purchase or get sex?" Buying and selling sex responses were reported individually in bivariate analyses; additionally, positive responses to either trading sex (selling) or trading for sex (purchasing) were summed and dichotomized to represent any TS.

Engagement in both transactional sex and concurrent substance use and sex (TS/CSS) was represented by a dichotomous interaction term created by multiplying the transactional sex variable by the variable assessing being almost always high while having sex with a man. This interaction does not presuppose that men were high during transactional sex, only that they reported engaging in both of these two behaviors within the past 90 days.

Predictor variables: *Severe depression* was assessed using a 9-item Depression Symptom Scale (DSS-9) [27]. The measure was recoded into non-clinical, moderate depression and severe depression categories, and then dichotomized (into severe depression vs. not).

Sexual compulsivity was assessed using the Sexual Compulsivity Scale [28]. Scores (range = 9–36; median = 12) were dichotomized to reflect high sexual compulsivity ($\geq$24 vs. <24), consistent with existing literature [29].

Homelessness was assessed by asking participants whether they had been homeless within the past year.

Current violence victimization was assessed by asking participants whether they had been physically, sexually, and/or emotionally abused within the past year.

Syndemic burden was assessed via a count measure (0–4) of positive scores for severe depression, high sexual compulsivity, homelessness, and past year violence victimization. This was recoded to dichotomously to represent bearing two or more syndemic conditions, consistent with the existing literature [6, 7].

Statistical Analysis

We structured the statistical analyses to (a) explore differences between MSMW and MSMO in engagement in transactional sex and concurrent substance use and sex; (b) explore whether, within MSMW, transactional sex and concurrent substance use and sex predicted high-risk UAI; and c) examine, within MSMW, whether background syndemic factors predicted engagement in transactional sex and concurrent substance use and sex.

We first used bivariate analyses (Pearson's Chi square tests for categorical variables and t-tests for continuous variables) to compare sociodemographic characteristics between MSMW and MSMO. We conducted one-way analyses of variance (ANOVA) to compare the mean numbers of male sexual partners in the past 90 days between MSMW and MSMO. Multiple logistic regression models tested associations between CSS and MSMW status; TS and MSMW status; and high-risk UAI and MSMW status. Each regression controlled for Black race, relative youth (less than 30 years old), annual income under $20,000, and Hispanic ethnicity. We then conducted multiple logistic regressions to test associations between syndemic conditions and TS and CSS on high-risk UAI among MSMW only, controlling for the covariates above. Finally, we conducted hierarchical logistic regressions within the MSMW subgroup to measure the contribution of syndemic properties to the variance in TS, CSS, and the TS/CSS interaction term. Statistical tests were performed using SPSS version 20.

Results

MSMW comprised 16.7 % ($n = 86$) of the sample. Table 1 shows that MSMW were significantly more likely than other MSM to identify as bisexual and as Black, to report past-year incomes of less than $20,000, and to report no education beyond 12th grade. No significant differences were noted in mean age or in the proportion of those who identified as Hispanic/Latino. MSMW reported a past-year mean of 6.5 female partners, and a past-90 day mean of 12.8 male anal sex partners (not significantly different from the 13.3 mean for MSMO).

Table 2 shows that compared with MSMO, MSMW were more likely to report having five or more drinks before sex (AOR = 1.8; 95 % CI 1.0–3.4), using ecstasy before sex (AOR = 2.8; 95 % CI 1.5–5.4), using powder cocaine before sex (AOR = 2.1; 95 % CI 1.3–3.4), and

Table 1 Sociodemographics and syndemic context of substance-using MSMW and MSMO ($n = 515$)

	Category	MSMO ($n = 429$)	MSMW ($n = 86$)	Chi square value	p value
Age	Mean (±s.e.)	39.2 (±0.5)	37.5 (±1.1)	–	n/s
	<30 years	85 (19.8 %)	18 (20.9 %)	0.06	n/s
Ethnicity	Hispanic	114 (26.6 %)	19 (22.1 %)	0.75	n/s
Race				54.3	<0.001
	Black or African-American	72 (16.8 %)	44 (51.2 %)		
	Asian	5 (1.2 %)	0 (0 %)		
	Native American	2 (0.5 %)	0 (0 %)		
	Caucasian	285 (66.4 %)	28 (32.6 %)		
	Other race	67 (15.6 %)	14 (16.3 %)		
Sexual identity				266.77	<0.001
	Gay	403 (93.9 %)	18 (20.9 %)		
	Bisexual	22 (5.1 %)	66 (78.6 %)		
	Homothug or other	4 (0.9 %)	2 (2.3 %)		
Syndemic conditions	Severe depression	160 (37.3 %)	27 (31.4 %)	1.08	n/s
	Sexual compulsivity	94 (21.9 %)	22 (25.6 %)	0.55	n/s
	Current violence victimization	104 (24.2 %)	19 (22.1 %)	0.18	n/s
	Homeless in past year	95 (22.1 %)	38 (44.2 %)	18.17	<0.001
Income/poverty	Annual income <$20,000	203 (47.3 %)	51 (59.3 %)	4.04	0.044
Educational attainment	High school degree or less	126 (29.4 %)	58 (67.4 %)	45.22	0.000

selling sex (AOR = 1.6; 95 % CI 1.0–2.8). They were also significantly more likely to have engaged in any TS (AOR = 1.7; 95 % CI 1.0–2.8). MSMW were significantly more likely than MSMO to report TS/CSS (AOR = 1.7; 95 % CI 1.0–3.0). MSMW were significantly less likely than MSMO to self-report being HIV positive (AOR = 0.4; 95 % CI 0.2–0.7). The majority of MSM (MSMO: 59.4 %; MSMW: 53.5 %) reported high-risk UAI within the past 90 days. Very high proportions of MSMW reported concurrent stimulant use and sex (70 %), almost always being high during anal sex with a man (57 %), and purchasing sex (39.5 %), though these rates were not significantly different than those reported by MSMO.

Within MSMW, TS and CSS were not significantly inter-correlated ($p > 0.05$; data not shown). Table 3 shows that among MSMW, CSS alone was not significantly correlated with high-risk UAI (AOR = 1.9; 95 % CI 0.7–4.8), though TS alone was (AOR = 2.7; 95 % CI 1.0–7.0). MSMW who engaged in both TS and CSS were significantly more likely to report high-risk UAI (AOR = 3.3; 95 % CI 1.2–9.6). MSMW who reported any high-risk UAI were no more likely to report any individual substance use concurrent with sex, or to suffer syndemic burden.

Table 4 presents findings from a hierarchical logistic regression within MSMW, in which syndemic factors significantly predicted TS/CSS, even after controlling for sociodemographic covariates. These models demonstrate that TS/CSS is significantly predicted by severe depression, which accounted for 17.5 % of the variance in these co-existing behaviors among MSMW. All told, syndemic properties contributed 23.7 % of the variance in engaging in both behaviors. In separate hierarchical logistic regression models controlling for sociodemographic covariates, syndemic properties were found to contribute 31.1 % ($p < 0.001$) of the variance in TS engagement; but only 3.6 % ($p = 0.62$) of the variance in CSS engagement (data not shown).

Discussion

MSMW are highly prevalent among our sample of high risk, heavy substance-using MSM in South Florida and may account for a substantial proportion of at-risk MSM in other HIV epicenters. Similar to findings from other research [30], MSMW in this sample were more likely than MSMO to identify as Black; they were also more likely to be impoverished and to have not progressed academically beyond high school. We have demonstrated that, within this population of substance-using MSM in South Florida, MSMW were significantly more likely than MSMO to engage in transactional sex; to report using several substances concurrently with sex; and to report engagement in both transactional sex and almost always being high during anal sex with men (TS/CSS). Within MSMW, the risk behaviors of TS and CSS predicted engagement in UAI with male partners of serodiscordant or unknown HIV status. TS/CSS was also significantly associated with

Table 2 HIV risk context among substance-using MSMW and MSMO ($n = 515$)

	Measure	MSMO ($n = 429$)	MSMW ($n = 86$)	AOR (95 % CI)[a]
HIV positive	Self-report	207 (48.3 %)	32 (37.2 %)	0.4 (0.2, 0.7)
Concurrent substance use and sex, last 90 days	5+ drinks before sex	285 (66.4 %)	68 (79.1 %)	1.8 (1.0, 3.4)
	Marijuana before sex	184 (42.9 %)	50 (58.1 %)	1.5 (0.9, 2.5)
	Ecstasy before sex	38 (8.9 %)	22 (25.6 %)	2.8 (1.5, 5.4)
	Crystal meth before sex	110 (25.6 %)	12 (14.0 %)	0.6 (0.3, 1.2)
	Powder cocaine before sex	131 (30.5 %)	44 (51.2 %)	2.1 (1.3, 3.4)
	Crack before sex	62 (14.5 %)	24 (27.9 %)	1.4 (0.8, 2.7)
	Any stimulant use before sex	237 (55.2 %)	60 (70 %)	1.6 (0.9, 2.7)
	Almost always high when having anal sex with a man	186 (43.4 %)	49 (57 %)	1.5 (0.9, 2.5)
Transactional sex, last 90 days	Traded sex for money, drugs, or gifts	89 (20.7 %)	30 (34.9 %)	1.6 (1.0, 2.8)
	Used money, drugs or gifts to purchase sex	90 (21 %)	34 (39.5 %)	1.6 (0.9, 2.8)
	Bilateral sex traders (both bought and sold)	46 (10.7 %)	21 (24.4 %)	1.6 (0.9, 3.1)
	Any transactional sex	133 (31 %)	43 (50 %)	1.7 (1.0, 2.8)
TS/CSS, last 90 days	Any transactional sex involvement *and* Almost always high when having anal sex with a man	78 (18.2 %)	29 (33.7 %)	1.7 (1.0, 3.0)
Sexual risk behavior, last 90 days	Any UIAI with a non-primary partner of serodiscordant/unknown status	176 (41 %)	34 (39.5 %)	0.8 (0.5, 1.4)
	Any URAI with a non-primary partner of serodiscordant/unknown status	169 (39.4 %)	19 (22.1 %)	0.4 (0.2, 0.8)
	Any UAI with any partner of serodiscordant/unknown status	255 (59.4 %)	46 (53.5 %)	0.7 (0.4, 1.1)

[a] Controlling for youth (age <30), annual income <$20,000, Black race, and Hispanic ethnicity

Table 3 Correlates of high-risk UAI among substance-using MSMW ($n = 86$)

	Measure	No high-risk UAI ($n = 40$)	High-risk UAI ($n = 46$)	AOR (95 % CI)[a]
HIV-positive	Self-report	9 (22.5 %)	23 (50 %)	2.1 (0.7, 6.0)
Concurrent substance use and sex, last 90 days	5+ drinks before sex	32 (80 %)	36 (78.3 %)	0.6 (0.2, 2.1)
	Marijuana before sex	22 (55 %)	28 (60.9 %)	1.1 (0.4, 2.8)
	Ecstasy before sex	13 (32.5 %)	9 (20 %)	0.4 (0.1, 1.1)
	Crystal meth before sex	6 (15 %)	6 (13.0 %)	1.1 (0.3, 4.3)
	Powder cocaine before sex	18 (45 %)	26 (56.5 %)	1.3 (0.5, 3.4)
	Crack before sex	7 (17.5 %)	17 (37 %)	2.2 (0.8, 6.4)
	Any stimulant use before sex	30 (75 %)	30 (65.2 %)	0.4 (0.1, 1.2)
	Almost always high when having anal sex with a man	18 (45 %)	31 (67.4 %)	1.9 (0.7, 4.8)
Transactional sex, last 90 days	Traded sex for money, drugs, or gifts	10 (25 %)	20 (43.5 %)	2.8 (1.0, 8.1)
	Used money, drugs or gifts to purchase sex	9 (22.5 %)	25 (54.3 %)	2.8 (1.0, 7.8)
	Bilateral sex traders (both bought and sold)	5 (12.5 %)	16 (34.8 %)	3.3 (1.0, 11.1)
	Any transactional sex involvement	14 (35 %)	29 (63 %)	2.7 (1.0, 7.0)
TS/CSS	Any transactional sex involvement *and* Almost always high when having anal sex with a man	7 (17.5 %)	22 (47.8 %)	3.3 (1.2, 9.6)
Syndemic burden	2 or more syndemic conditions	17 (42.5 %)	24 (52.2 %)	1.5 (0.6, 3.8)

[a] Controlling for youth (age <30), annual income <$20,000, Black race, and Hispanic ethnicity

severe depression and overall syndemic burden suffered by MSMW; syndemic associations with transactional sex were particularly profound. In contravention to other recent studies of MSM [6–8, 26, 29], we did not find a direct association between high-risk UAI and overall syndemic burden among MSMW. This may be a reflection of the

Table 4 Syndemic correlates of transactional sex and concurrent substance use and sex (TS/CSS) among MSMW ($n = 86$)

	Beta	s.e. (B)	OR (95 % CI)	Nagelkerke R-square	R-square change
Step 1				0.119	0.119
Income <$20,000	0.038	0.524	1.0 (0.4, 2.9)		
Black/African-American	0.990	0.561	2.7 (0.9, 8.1)		
Hispanic or Latino	−0.046	0.717	1.0 (0.2, 3.9)		
Age <30	−0.937	0.710	0.4 (0.1, 1.6)		
Step 2				0.294**	0.175***
Income <$20,000	−0.197	0.560	0.8 (0.3, 2.5)		
Black/African-American	1.320	0.632	3.7 (1.1, 12.9)		
Hispanic or Latino	0.234	0.781	1.3 (0.3, 5.8)		
Age <30	−1.250	0.796	0.3 (0.1, 1.4)		
Severe depression (DSS-9)	1.915	0.568	6.8 (2.2, 20.7)		
Step 3				0.325**	0.031
Income <$20,000	−0.472	0.599	0.6 (0.2, 2.0)		
Black/African-American	1.210	0.641	3.4 (1.0, 11.8)		
Hispanic or Latino	0.016	0.798	1.0 (0.2, 4.9)		
Age <30	−1.270	0.819	0.3 (0.1, 1.4)		
Severe depression (DSS-9)	1.757	0.580	5.8 (1.0, 18.1)		
High sexual compulsivity	0.993	0.635	2.7 (0.8, 9.4)		
Step 4				0.332**	0.007
Income <$20,000	−0.472	0.605	0.6 (0.2, 2.0)		
Black/African-American	1.208	0.645	3.3 (0.9, 11.8)		
Hispanic or Latino	0.064	0.801	1.1 (0.2, 5.1)		
Age <30	−1.401	0.859	0.2 (0.0, 1.3)		
Severe depression (DSS-9)	1.651	0.597	5.2 (1.6, 16.8)		
High sexual compulsivity	1.121	0.667	3.1 (0.8, 11.3)		
Abused in last year	0.484	0.677	1.6 (0.4, 6.1)		
Step 5				0.356**	0.024
Income <$20,000	−0.711	0.641	0.5 (0.1, 1.8)		
Black/African-American	1.130	0.653	3.1 (0.9, 11.1)		
Hispanic or Latino	0.144	0.812	1.2 (0.2, 5.7)		
Age <30	−1.396	0.862	0.2 (0.0, 1.3)		
Severe depression (DSS-9)	1.369	0.628	3.5 (1.1, 13.5)		
High sexual compulsivity	1.224	0.678	3.4 (0.9, 12.8)		
Abused in last year	0.301	0.687	1.4 (0.4, 5.2)		
Homeless in past year	0.874	0.620	2.4 (0.7, 8.1)		

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

small sample size of MSMW ($n = 86$) and diminished variance resulting from our elision of substance abuse as a contributor to syndemic burden due to our sample population (substance-using MSM), rather than any presumptive differences within MSM subgroups in syndemic effects on sexual risk behavior.

It is well documented that high levels of substance use among sexually active MSM have been consistently associated with higher risk of HIV infection and a sequelae of other physical and mental health morbidities [8, 23]. What might compel generally higher rates of concurrent substance use and sex among MSMW? An emergent literature has shown that MSMW suffer disparate rates of internalized homophobia [31] compared with MSMO and may have less success resolving their sexual identities because of the liminal status of bisexuality in a culture that emphasizes binary categories over continua [32]. As a result, they may be more susceptible than MSMO to use substances during same-gender sex—for such intertwined reasons as sexual disinhibition, escapism, belonging, or self-destruction [19, 21]. North American MSMW have reported frustration with "invisible" identities and biphobic harassment from both gay/lesbian and straight communities and partners [33, 34]. An important tenet of Syndemics Theory for MSM is that gay men are able to harness the organic support offered by gay and lesbian

communities, which can provide necessary social support while also imparting positive (i.e., safer sex) and negative (i.e., frequent substance use) community norms [1]. Those who behave and/or self-identify bisexually have been found to be relatively disengaged from both gay/lesbian communities [35]. Without supportive, established bisexual communities or a sense of belonging to either gay or straight cultures, MSMW may tend to secret their sexual behaviors, fail to fully attach themselves to support mechanisms, and utilize situational contexts such as TS and CSS that allow them to pursue same-sex sexual expression yet simultaneously proffer psychological distance from underlying feelings of guilt, shame, and homophobia/biphobia. The lack of educational attainment among MSMW in this sample is particularly striking, and may also constitute an important background factor in their disproportionately high rates of poverty, homelessness, and involvement—for the purpose of survival—in trading sex for money, drugs, or gifts.

This study has several important limitations. First and foremost, the non-random sampling frame of very high risk substance-using MSM in South Florida is unlikely to be generalizable to the larger MSMW population. Recruitment strategies targeted substance-using MSM generally; because of this, results may not be generalizable to substance-using MSMW as a whole, or to substance-using MSMW recruited primarily from a group of men who have sex with women. Additionally, as our study was restricted to men 18 years of age and older, we were unable to examine these HIV risk behavior contexts among MSM youth under 18, a population facing particularly high risk of HIV acquisition. Certain variables created, such as those that reflect bilateral sex traders (those who both buy and sell sex), or men engaged in TS/CSS, may not serve as useful measures in less targeted samples. Though it is very likely, we cannot be certain that that the TS/CSS interaction describes concomitant behaviors: in other words, whether having anal sex while high occurred within a transactional context and whether, by extension, high-risk UAI was a typical result of these transactions. A model testing whether TS/CSS involvement mediates the relationship between syndemic burden and high-risk UAI among MSMW was not theoretically supported given the cross-sectional nature of these data and the difficulty of establishing a temporally causal relationship between these three interlinked domains. Motivations for TS/CSS among MSMW may be diverse: without more precise measures or qualitative follow-up research, we cannot conclude to what extent survival sex, drug-sex exchanges, unfulfilled bisexual desire, and/or insufficient community supports contribute to TS/CSS involvement. Although the proportion of MSMW in this sample was substantial, their total number (86) may have been too small to effectively distinguish significant correlates for outcomes of interest; the sample size also made it unfeasible to conduct additional subgroup analyses (for instance, by race) within MSMW. The alarmingly elevated rates of psychosocial health conditions reported by the full sample reduced the possibility that significant differences between MSMW and MSMO would be detected during statistical testing. Our measures of participants' HIV status and their sexual partners' HIV status are likely understated, as they relied on self-reports and secondhand perceived reports, respectively, rather than biological specimens; non-white MSM, in particular, may be unaware of being HIV positive [36]. Lastly, the questions related to transactional sex may be subject to recall bias, as they used 12-month behavioral windows; unfortunately, there are currently no validated measures for transactional sex involvement.

Our findings related to the importance of TS/CSS behaviors to high-risk UAI among substance-using MSMW, however, are robust. Given the predominance of cross-sectional reports in the existing literature related to TS and/or CSS among MSMW and syndemics among MSM, there is a pressing need for longitudinal research that can illuminate mediators and moderators of the relationship between MSMW behavior, syndemic burden, TS and CSS involvement, and high-risk sexual behavior; and that can explore characteristics of syndemic production particular to this population's extra-marginalization that may be associated with poor educational and economic contexts and, ultimately, negative health outcomes [37]. We propose that the development of interventions that target TS and CSS—for instance, by addressing safer transactional sex or by empowering men to enhance social supports that may mitigate TS involvement among MSM [38]—may maximize the relevance of health promotion efforts targeting MSMW. Interventions that attempt to decrease the syndemic burden faced by MSMW—for example, those that provide substance abuse treatment and mental health support for depression and sexual compulsivity, as well as ancillary social services including transitional housing, educational assistance, and job readiness training—may also bolster these men's ability to reduce their rates of TS and CSS. Recent research has demonstrated that MSMW increase social networks' interconnectivity (density) and range (breadth), indicating that interventions for MSMW may also need to contain network-level components [39]. Networks based on transacting money and drugs for sex and that are centered on MSMW may be particularly well-suited to such approaches for three key reasons. First, their members are at high risk for HIV/STI acquisition and transmission across networks [39]. Second, their members may have the means to contact one another, like other hard-to-reach populations who have been successfully recruited via respondent-driven sampling

procedures. Finally, members of these networks with low annual incomes and poor employment prospects may be likely to uptake public health strategies that are incentive-based, such as Social Network Strategy for HIV Counseling and Testing.

The scientific literature has portrayed MSMW as a small proportion of MSM who are strategically important targets for HIV prevention because of their potential to transmit HIV to female partners. Our results show that MSMW are not a small population among high-risk MSM in South Florida and that their health risks are important in their own right. Prevailing depictions of bisexually behaving men as an HIV transmission risk to female sexual partners ignores their own risk of acquiring HIV (from men as well as women) as well as their risk of transmitting HIV to male partners. Intervention frameworks that consider bisexually behaving men solely as agents of infection are unlikely to effectively attract such men into interventions that will lower HIV-related risks for them and, consequently, for the people with whom they partner. Developing holistic interventions for substance-using MSMW that address involvement in transactional sex and concurrent substance use and sex has relevance for not only public health, but also human rights.

Acknowledgments This research was supported by Department of Health and Human Services (Grant Number 5 R01 DA024579) from the National Institute on Drug Abuse. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute on Drug Abuse or the National Institutes of Health.

Conflict of interest None.

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